# Sample Question Paper

# Class – XII (2014-15)

# Biology

# Marking Scheme

## Section - A

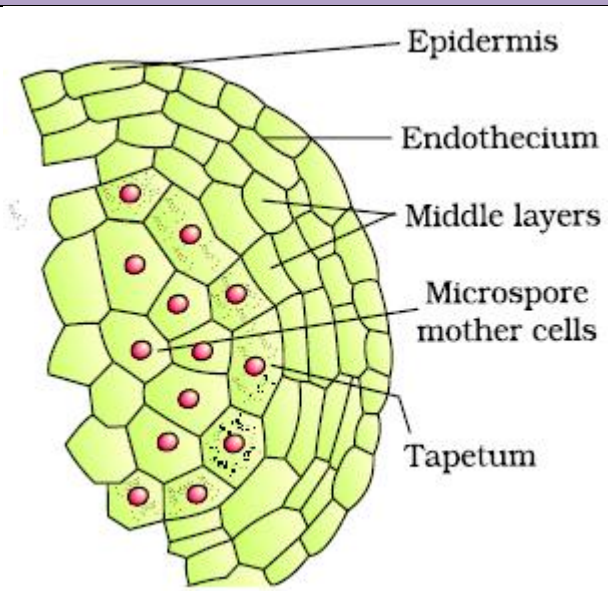
| Q. No. | Suggestive answer | Marks distribution | Total marks |
|---|---|---|---|
| 1 | Meristematic tissues are free of virus | 1 | 1 |
| 2 | RNA interference | 1 | 1 |
| 3 | Intra Cytoplasmic Sperm Injection<br>(No marks for abbreviation - ICSI) | 1 | 1 |
| 4 | Distance between two consecutive base pairs = 0.34 x $10^{-9}$ m<br>The length of DNA in bacteriophage lambda = 48502 x 0.34 x $10^{-9}$ m<br>= 16.49 x $10^{-6}$ m | ½<br>½ | 1 |
| 5 | Frequency of recombination will be higher | 1 | 1 |

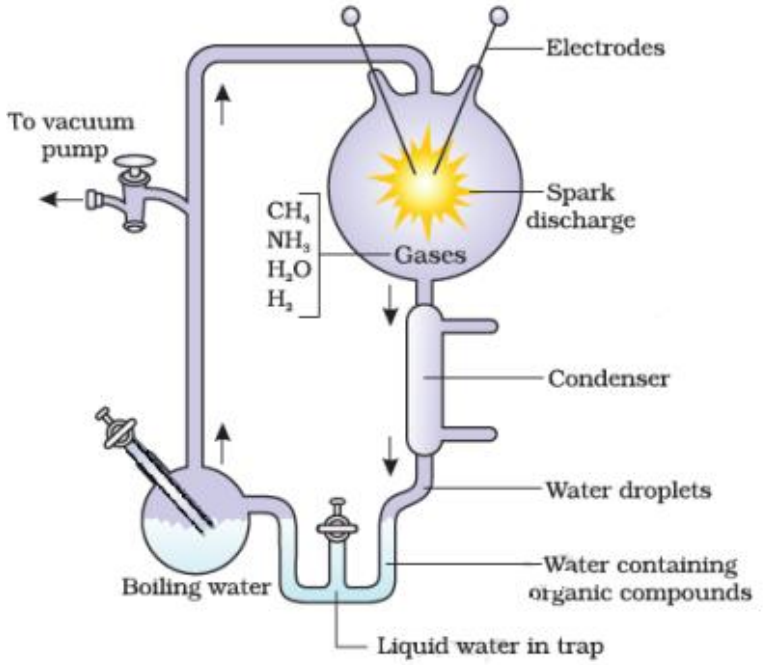
## Section - B

| Q. No. | Suggestive answer | Marks distribution | Total marks |
|---|---|---|---|
| 6 | Population control measures are:<br>- Use of contraceptive methods, to prevent pregnancy<br>- Advertisements in the media, to generate awareness<br>- Statutory raising of marriageable age of the female to 18 years and that of males to 21 years, to delay the number of births<br>- Incentives given to couples with small families, to motivate others to comply<br>(Any two of the above measures with explanation) | ½ x 2 = 1<br>½ x 2 = 1 | 2 |
| 7 | Down's syndrome is Trisomy affected chromosome number 21/can occur in either males or females / total number of chromosome is 47 (any two)<br><br>Turner's syndrome is monosomy of the X - chromosome/ can occur only in females/ total number of chromosome is 45 (any two) | ½ x 2 = 1<br><br>½ x 2 = 1 | 2 |
| 8 | *Spirulina*<br>Produces large quantities of food rich in protein, minerals, fats, carbohydrates and vitamins //<br>*Methylophilus methylotrophus* | | 2 |

| | | | |
|---|---|---|---|
| | 250 gm of this microorganism produces 25 tonnes of protein per day<br>(Any of the above two)<br><br>**OR**<br><br>Multiple Ovulation Embryo Transfer Technology Produces 8-10 eggs at a time, Genetic mother is only available for super – ovulation; increases herd size in a short time<br>(Any two) | 1 x 2 = 2<br><br>1<br><br>½ x 2 = 1 | |
| 9 | a) Streptokinase, *Streptococcus*<br>b) Curd contains Lactic Acid Bacteria, which play beneficial role in checking disease causing microbes / It is a source of vitamin $B_{12}$ too | ½ x 2 = 1<br>½ x 2 = 1 | 2 |
| 10 | - Decline in plant production<br>- Lowered resistance to environmental perturbations such as drought<br>- Increased variability in certain ecosystem processes such as plant productivity/ water use / pest & disease cycles<br>(any two) | 1 x 2 = 2 | 2 |

## Section - C

| Q. No. | Suggestive answer | Marks distribution | Total marks |
|---|---|---|---|
| 11 |  <br>(Any four of the labels)<br>Tapetum nourishes the developing pollen grains | ½ x 4 = 2<br>1 | 3 |
| 12 | a) Isogametes<br>b) Fertilization and zygote<br>c)*Cladophora / Clamydomonas* | 1<br>½ x 2 = 1<br>1 | 3 |

| | | | |
|---|---|---|---|
| 13 |  <br>(Any six different labels) | ½ x 6 = 3 | 3 |
| 14 | a) Axial position<br>b) AA x aa P<br>(Axial) (Terminal)<br>A a<br>Aa (Axial) $F_1$<br>Aa x Aa Selfing<br>A a A a<br>AA Aa Aa aa $F_2$<br>¼ ½ ¼ | ½<br>½<br>½<br>½<br>1 | 3 |
| 15 | a) Adaptive radiation – The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats).<br>b) Tiger cat/banded ant eater/Marsupial rat/Kangaroo/Wombat/Bandicoot/Koala/Marsupial mole/Sugar glider<br>c) Wolf is a placental mammal, whereas Tasmanian wolf is a marsupial mammal | ½ x 2 = 1<br>1<br>½ x 2 = 1 | 3 |
| 16 | Doctor confirms pneumonia on the basis of the following symptoms – fever/chills/grey – blue lips and finger nails (any two);<br><br>and not common cold as the following symptoms are not observed – Nasal congestion/sore throat/hoarseness (any | ½ x 2 = 1<br>½ x 2 = 1 | 3 |

| | | | |
|---|---|---|---|
| | two)<br>Precautions –<br>1) Cover the nose when near the patient<br>2) Do not share glasses and utensils / articles used by the infected person | <br>½ x 2 = 1 | |
| 17 | Rumen of cattle<br>Breakdown of cellulose<br>Anaerobic condition | 1<br>1<br>1 | 3 |
| 18 | Gene Therapy<br><br>ADA (Adenosine deaminase) deficiency has been treated through gene therapy<br><br>Lymphocytes from the blood of the patient are grown in a culture, a functional ADA cDNA is introduced into these lymphocytes, which are subsequently returned to the patient. The permanent cure is done by introducing ADA cDNA into cells at early embryonic stages. | ½<br><br>½<br><br>½ x 4 = 2 | 3 |
| 19 | Drug dependence - is the tendency of the body to manifest a characteristic and unpleasant withdrawl syndrome if regular dose of drugs is abruptly discontinued / because of perceived benefits, drugs are frequently used repeatedly from which the person may not be able to get out.<br><br>Measures:<br>- Education and counseling - to face problems and stresses/ to channelize the energy into healthy persuits like reading, music, yoga and other extracurricular activities<br>- Seeking help from parents - to guide the person appropriately and immediately<br>- Seeking professional and medical help - to help the person to get rid of the problem completely with sufficient efforts and will power<br>(any two) | ½ x 2 = 1<br><br><br><br>½ x 4 = 2 | 3 |
| 20 | a) Positive terminal – 'B'<br>Negative terminal – 'A'<br><br>b)DNA being negatively charged, moves towards the positive electrode (anode)<br><br>c) By elution – separated bands of DNA are cut out from the agarose gel and extracted from the gel piece<br><br>**OR**<br><br>a) Bt corn<br>b) *Cry I Ab*/ Bt toxin gene codes for crystal protein; the Bt toxin protein exists as an inactive protein, but once an insect ingests it, it gets converted into an active form due to the alkaline pH of the gut which solubilizes the crystal. The activated toxin binds to the surface of mid gut and creates pores that cause swelling, lysis and eventually death of the insect. | ½ x 2 = 1<br><br>½ x 2 = 1<br><br>½ x 2 = 1<br><br><br><br>½<br>½ x 5 = 2½ | 3 |

| | | | |
|---|---|---|---|
| 21 | a) Bam HI should be used, as restriction site for this enzyme is present in $tet^R$ region<br><br>b) PvuI will not be used, as restriction site for this enzyme is present in $amp^R$ region (not in $tet^R$)<br>EcoRI will not be used, as restriction site for this enzyme is not present in selectable marker $tet^R$ | 1 x 2 = 2<br><br>½<br><br>½ | 3 |
| 22 | a) 'X' axis – Mean annual precipitation (cm)<br>'Y' axis – Mean annual temperature ($^0$C)<br><br>b) Grassland – B<br>Coniferous forest – E<br><br>c) The mean annual temperature ranges from -12 to 2$^0$C error accepted ± 2 and mean annual precipitation ranges from 10 – 125 cm, these are the optimum conditions in tundra biome | ½ x 2 = 1<br><br>½ x 2 = 1<br><br>½ x 2 = 1 | 3 |

## Section - D

| Q. No. | Suggestive answer | Marks distribution | Total marks |
|---|---|---|---|
| 23 | Father explains that it will lead to generation of e – waste;<br>Difficulty in recycling e – waste / hazardous nature of recycling of e – waste / exposing workers to toxic substances present in e – waste<br>(Any one)<br><br>Son's wish to update his father with modern techniques, Awareness about trends and technologies, well versed with their applicability in daily life (any other similar / appropriate values)<br><br>Concern for environment, scientific thinking, inquisitive nature, social awareness, judicious use of money, sense of responsibility (any other similar / appropriate values) | 1<br><br>½ x 3 = 1½<br><br>½ x 3 = 1½ | 4 |

## Section - E

| Q. No. | Suggestive answer | Marks distribution | Total marks |
|---|---|---|---|
| 24 | a) A is able to penetrate/ fertilize the ovum, whereas B and C are unable to penetrate/ fertilize // B and C will degenerate<br><br>b) Zona pellucida ensures the entry of only one sperm into the ovum<br><br>c) Induces completion of meiotic division of the | ½ x 2 = 1<br><br>1<br><br>½ x 2 = 1 | 5 |

| | | | |
|---|---|---|---|
| | secondary oocyte, formation of second polar body and a haploid ovum<br><br>d)Enzymes of acrosome (½ mark if only 'acrosome' is written)<br><br>e) Ampullary – isthmic junction of the fallopian tube<br><br>**OR**<br>a) A – Estrogen<br>B – Progesterone<br><br>b) A – Maturing ovarian follicle / Graafian follicle<br>B – Corpus luteum<br><br>c) Formation of Graaffian follicle (releases estrogen) is followed by the formation of corpus luteum (releases progesterone)<br><br>d) Role of A (Estrogen) – leads to changes in the ovary and uterus / regeneration of endometrium through proliferation<br><br>Role of B (Progesterone) – Maintenance of endometrium for implantation of the fertilized ovum/ maintenance of other events of pregnancy<br><br>e) In case of pregnancy | <br><br>1<br><br>1<br><br><br>½ x 2 = 1<br><br>½ x 2 = 1<br><br>1<br><br>½<br><br>½<br><br>1 | |
| 25 | For initiation, the ribosome bind to the mature m – RNA at the start codon (AUG) that is recognised by the initiator t – RNA. During elongation, charged t RNA sequentially binds to the appropriate codon in m- RNA with the aniticodon present on tRNA. The ribosome moves from one codon to another adding amino acids one after the other to form polypeptide, i.e. translation. During termination, the release factor binds to stop codon (UAA, UAG, UGA), terminating translation and releasing the polypeptide chain.<br><br>**OR**<br>Methodology used –<br>Sequence Annotation – total DNA from a cell is isolated,<br>converted into random fragments of relatively smaller sizes,<br>and cloned in suitable host using specialized vectors.<br>The cloning resulted into amplification of each piece of DNA fragment.<br>The fragments were sequenced using automated DNA sequencers,<br>these sequences are then arranged based on some overlapping regions (present in them).<br>This requires generation of overlapping fragments (for sequencing). | ½ x 10 = 5<br><br><br>½ x 2 = 1<br>½<br>½<br>½<br>½<br>½<br>½ | 5 |

| | | | |
|---|---|---|---|
| | Specialized computer based programmes were developed, and<br>these sequences were subsequently annotated and assigned to each chromosome. | ½<br>½ | |
| 26 | i) Productivity – conversion of inorganic into organic material with the help of solar energy by the autotrophs<br>ii) Energy flow – unidirectional movement of energy towards higher trophic level (and its dissipation and loss as heat to the environment)<br>iii) Decomposition – fragmentation, leaching, catabolism, humification, mineralization by bacteria, fungi and flagellates (abundant at the bottom of lake)<br>iv) Nutrient cycling – decomposition of dead matter to release the nutrients back to be re-used by the autotrophs<br><br>Food chain in aquatic ecosystem (lake)<br>Phytoplanktons ⇨ Zooplanktons ⇨ Small fish ⇨ Big fish (Any other appropriate example)<br><br>**OR**<br><br>a) Pioneer species, lichen<br>b) Phytoplankton – hydric<br>⇩<br>Submerged plant stage<br>⇩<br>Submerged free floating plant stage<br>⇩<br>Reed swamp stage<br>⇩<br>Marsh – meadow stage<br>⇩<br>Scrub stage<br>⇩<br>Forest stage – Mesic<br><br>c) Forest | ½ x 2 = 1<br>½ x 2 = 1<br>½ x 2 = 1<br>½ x 2 = 1<br><br>1<br><br>½ x 2 = 1<br>½ x 7 = 3½<br><br>½ | 5 |

***